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Do Exurban Communities Want More Development?

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ABSTRACT

This paper reports on a stated preference study of exurban Rhode Island residents that assessed the relative attractiveness of a variety of commercial and recreational land uses. Focus group participants and town planners proclaimed a demand for certain commercial developments such as grocery stores and fine-dining restaurants, but survey respondents generally exhibit a strong preference for no additional development beyond the status quo current rate of development. If additional development is to occur, then recreational type development is generally preferred over commercial development. Results identify distinct groups of residents with heterogeneous preferences for different types of development.

KEYWORDS

Rural development, commercial development, recreation, preservation, public preferences, stated preferences, land use planning, choice experiment, ranking

Since the end of World War II, there has been migration of people from urban centers to suburban areas and beyond (Fuguitt, 1995). The largest growth in land conversion is now occurring outside the suburban ring, in exurban communities (Irwin et al., 2009; Lamb, 1983; Nelson and Dueker, 1990; Sutton et al., 2006). These traditionally rural towns are no longer strictly farming communities, but offer residents a diversity of amenities including clean air and water, scenic vistas, privacy, reduced traffic congestion, and nature-based recreation (Daniels and Lapping, 1996; Deller et al., 2001; Hart, 1995; Long, 1999). While lower-density development can sustain rural amenities, it can also result in less convenient access to urban-type amenities. Many exurban residents want to combine the best of urban and rural living (Dubbink, 1984; Jacobson, 1998). Nelson (1992) describes exurbia as a heterogeneous landscape of suburban-style subdivisions, large-lot residences, and village centers within a reasonable commute of major employment centers. This heterogeneous landscape likely corresponds to a heterogeneous mix of residents. For example, newcomers and lifelong residents can hold conflicting visions of the ideal community, with new arrivals actively pressuring town officials to encourage missing amenities or, alternatively, to prevent future growth (Johnston et al., 2003b; Spain, 1993). Yet, vocal residents may not represent the silent majority. By understanding the demand of residents for more or less development, planners and town leaders may better serve their constituents as developers bring new proposals through permitting processes, and as town officials evaluate proposed reforms that balance development with land conservation. This paper assesses the demand for commercial and recreational development of residents in four Rhode Island communities and illustrates how planners may uncover misconceptions about and priorities for land conversion through examining residents' preferences for their communities.

Local communities can provide economic incentives to foster development or preserve open space that corresponds to residents' preferences. For example, if the town is lacking a major grocery store, it could provide tax breaks to attract a new grocery store into the town. Alternatively, a town's planning board can require extra mitigation efforts for less desirable development. For example, if a developer wants to put in a multi-screen cinema complex that is opposed by residents, the town may charge impact fees to cover the costs of additional traffic controls or ask the developer to provide an additional amenity that the residents desire as a form of compensation. A systematic understanding of residents' preferences (demands) can provide town officials with a valuable foundation for decision-making, from zoning changes to new rules governing particular types of development to open space planning.

Anonymous surveys are one vehicle planners can use to determine what the majority of residents want (Lindsey, et al., 1995). Prior research has assessed public preferences for open space and recreational amenities (Adamowicz, et al., 1998; Geoghegan, 2002; Johnston, et al., 2001; Kline and Swallow, 1998; McGonagle and Swallow, 2005; Rosenberger and Loomis, 1999). However, to the best of our knowledge, no study has looked at public preferences for commercial developments or the public's willingness to make trade offs between commercial and recreational developments. This paper presents the results of a Rhode Island case study that uses a stated preference survey to assess exurban residents' preferences for both commercial and recreational development amenities. Planners in the study towns typically indicated that residents opposed development generally, but that particular types of development might gain wide support. Our application of stated preference methods evaluates this supposition of planners. While our analysis focuses on the insights for planners, we also illustrate a relatively new econometric method (Fok et al., 2012) for analysis of stated-ranking data. The analysis links

characteristics of exurban residents with heterogeneous preferences for different types of development amenities. Results suggest an overall opposition to both commercial and recreational land conversion as compared to the status quo; however, if additional development were to occur, there exists a strong preference for recreational development over commercial development. Although the case study is specific to Rhode Island, the study offers insights for better growth management in other exurban areas. The next section describes the study area, four towns in western Rhode Island. The third section explains the methods used in collecting and analyzing data. The fourth section discusses the results. The last section provides a summary and conclusions.

STUDY AREA

Rhode Island is the second most densely populated U.S. state, with 1018 people per square mile (US Census Bureau, 2012). Its two major urban centers are the Providence metro area at the northern-most point of Narragansett Bay and Newport at the southern entrance to the bay on the Atlantic Ocean. These urban centers are immediately surrounded by areas of suburban communities with contiguous single-family home subdivisions and a variety of densely configured commercial developments. The southwest bay and southern coastal communities are also dominated by suburban-style development. The remaining towns on the southeast bay and along the western half of the state bordering Connecticut, all of which fall within a 60-mile radius of a major employment center, were historically traditional rural communities but now resemble Nelson's (1992) exurban heterogeneous mix.

Rhode Island experienced moderate growth in population (10.4%) over the period of 1970 to 2000, while the number of households increased almost four times as much (39.9%)

(Rhode Island Statewide Planning Program, 2000).[1] The major portion of this disparity occurred during the 1970s when Rhode Island had a minor drop in population (–0.3%) but a substantial growth in households (16%). This trend corresponds to a migration of residents from urban centers to western and coastal towns. Land use changes have not been limited to residential development (Rhode Island Statewide Planning Program, 2000). While urban centers continue to employ 42 percent of the Rhode Island workforce, cities have lost more than 10,000 jobs since 1970 while the suburban communities have gained about 60,000 jobs. The amount of land used for commercial purposes doubled for suburban, western, and coastal communities during the 1980s, while the amount of land used for agricultural production continued a century-long decline. Yet, more than 480,000 acres of undeveloped mostly forested land still remain available for potential conversion either to developed uses or back to agricultural uses. Agricultural production is no longer economically dominant (orchards, turf grass, and hobby farms are the exception) and agricultural land has gradually returned to a natural wooded state. Formal protection of undeveloped open space has increased from less than 50,000 acres in 1970 to more than 120,000 acres in 1995.

In Rhode Island, all land falls within one of 39 incorporated towns or cities, and towns are analogous to townships in many other states. The four exurban towns used in this case study are all located in the western half of the state. We avoided coastal communities in order to minimize any summer-home effects in our analysis. The four study towns were chosen based on their recent experience with urban sprawl, but differing population sizes, densities, and growth rates (Table 1). Year 2000 population ranged from 5085 residents (99 per square mile) in West Greenwich to 33,668 residents (539 per square mile) in Coventry. Population growth rates for

[1] Percentages have been adjusted to incorporate actual 2000 Census data. Relative to the time of data collection, the 2000 Census provides the most relevant context for the coming analysis. This study reports on a unique data set from a survey that also other rural land use issues discussed elsewhere (Johnston et al, 2002; 2003a, b).

the 1990-2000[2] period range from a 2.7 percent loss in Burrillville to a 45.6 percent gain in West Greenwich, versus a 4.5 percent gain for the state of Rhode Island as a whole. Burrillville went through its heaviest growth in the 1970s and 1980s while West Greenwich is experiencing its heaviest growth now. Noticeably, over the period of 1990 to 2000, despite a loss of 434 people over the last decade, Burrillville still gained an additional 70 housing units. Demographics (age, income, and education) as of the year 2000 show Burrillville and Coventry residents to be similar and Exeter and West Greenwich residents to be similar, though Coventry has a much smaller percentage of its population in prime working age than the other three towns and less than the average for Rhode Island. All four towns contain a mix of residential land use including suburban subdivisions, village centers, large-lot rural residential, and farms. In addition, each town was less than fifty percent developed at the time of the study.

METHODS

Survey Design and Implementation

Researchers commonly use the stated preference method to estimate the value of environmental goods that benefit many people simultaneously or market goods that are not currently available but may be offered at some time in the future (Champ et al., 2003; Louviere et al., 2000). Stated preference surveys present respondents with hypothetical scenarios and ask them to state which scenario or alternative they prefer most. In some cases, respondents are asked to rank several alternatives from most preferred to least preferred. Ranking questions provide more information per question than a simple pick-one-best-alternative question, and thus are beneficial when space or time constraints exist (Beggs et al., 1981; Allison and Christakis, 1994). The stated preference method assumes respondents answer in a manner consistent with

[2] Year 2010 population, housing units, and population growth rate from 2000-2012 are also shown in Table 1.

maximizing their utility or personal satisfaction. The Rhode Island Rural Land Use Survey was designed to assess rural (exurban) residents' land use preferences and their willingness to make tradeoffs between development alternatives. This paper focuses on questions related to residents' preferences for commercial and recreational types of development. Analyses of additional questions related to residents' preferences for new residential developments are reported elsewhere (Johnston, et al., 2002a, 2003a, 2003b).

Following Mitchell and Carson (1989), the survey was developed over 18 months that included: a review of the growth management literature; interviews with town planners and other state and local officials; focus groups with residents of exurban towns; and a series of survey-instrument pre-tests. It was discovered through expert interviews and focus groups that, despite an overall opposition to additional development, certain types of commercial services may be highly desirable in exurban towns. This is particularly possible if the town is lacking certain "necessary" conveniences. For example, one focus group participant complained of having to drive to the next town to shop at a major grocery store, while another lamented the lack of a "really nice" restaurant in her town. One town planner told us that the town council was pro-development, but the council didn't know what type of development it wanted to pursue. The question then becomes, would residents be willing to pay more, in taxes or fees, to encourage particular types of development to occur? If so, how would this willingness-to-pay compare across different types of development and among different types of residents?

Extensive focus groups and pre-testing of the survey instrument enabled us to determine the amount and type of background information to provide, compile a list of reasonable and interesting development scenarios, choose appropriate language to assure researchers and respondents understood questions the same, and keep the survey short enough to be completed in

under 20 minutes (the maximum time participants said they would spend on any survey, even one of interest to them specifically). Figure 1 shows a sample survey question. Respondents were asked to rank four commercial or recreational development options for which their town could provide economic incentives. Three of the options involved some type of land use change, ranging from major building construction with parking lots to permanent preservation of undeveloped land. The fourth option (always labeled option D) was a status quo alternative that allowed for no *additional* development "beyond what is currently taking place in your town." That is, the survey emphasized that current development would not be stopped completely, and that each of the development alternatives were above and beyond development that was already taking place. According to pre-test participants, this status quo alternative made the survey questions more realistic in that it allowed them to "vote no" to some new development while recognizing that existing development trends would generally continue (Adamowicz et al., 1998).

Based on feedback from focus groups, expert interviews, and pre-test participants, development alternatives were described by seven main attributes: commercial or recreational service(s) provided, proximity to the respondent's home, location on a main street or back road, number of acres being converted or preserved, land type of the parcel prior to development, change in traffic controls, and increase in annual taxes above the current tax rate. Table 2 (upper section) describes the main land parcel attributes and their corresponding levels. Many pre-test participants commented that some of the attributes would be positive or negative depending on whether the development was commercial or recreational. This resulted in our distinguishing between acres, proximity, and road type for commercial and recreational types of development. Since land preserved in its natural state would likely be valued differently from land converted to

developed uses, land types are categorized by either preservation or conversion. Note that wildlife refuges are the only service types that preserve land in its natural state. All other service types result in some form of land conversion. Even sports fields and golf courses require tree removal, lawn mowing, and other forms of ongoing maintenance. Because commercial developments often involve multiple service offerings within strip malls (as opposed to stand alone stores), the survey design allowed for commercial development alternatives to contain two different service types (e.g., a retail store *and* a fast food restaurant).

It would be impossible to assess every possible combination of attributes and attribute levels, because the required number of unique survey questions would be prohibitively large. Thus, we used a fractional factorial design to generate 86 different survey questions sufficient for econometric estimation (Addelman, 1962; Louviere et al., 2000, chapter 4).[3] Each survey question contains three development alternatives and the status quo option, resulting in an overall evaluation of 259 different land use scenarios in this study. Two questions were paired up in each of 43 versions of the survey booklet. The experimental design used two questions per booklet in order to allow space for additional questions addressing other objectives of the larger study (as cited above). A second set of questions asked for respondent socio-economic characteristics including age, education, income, residential type, and length of residency. These demographic attributes, with corresponding mean values or percentage of respondents, are described in Table 2 (lower section).

Following Dillman's (2000) total design method, surveys were mailed to 4000 residents, 1000 in each of the four study towns. The total design method involves multiple mailings over several weeks: (1) a preview letter describing the purpose of the study, (2) the survey instrument, (3) a reminder postcard, (4) a second copy of the survey to non-respondents only, and (5) a

[3] The factorial design was provided by Dr. Donald Anderson, StatDesign, Inc., Evergreen, CO.

second reminder postcard to non-respondents only.[4] This method is used to increase response rates and reduce response bias.

Random Utility Theory and Latent-class Rank-ordered Logit Model

Stated preference surveys measure values of public goods by asking respondents to select their most preferred alternative from a set of two or more alternatives. The analysis accepts the respondent's answer to a choice question as a statement that the utility or satisfaction, U_j, gained from alternative j exceeds the utility that would have been gained from a different alternative. Stated preference ranking studies ask survey respondents to rank a set of three or more alternatives in order from their most preferred to their least preferred option. Respondents pick their first choice out of an original set of J alternatives, their second choice out of the remaining J-1 alternatives, their third choice out of the remaining J-2 alternatives, and so on until all J alternatives have been ranked. By observing these choices, econometric analysis identifies a statistical relationship between the attributes comprising each alternative and the probability that the respondent states a particular choice or rank (Adamowicz et al., 1998; Louviere et al., 2000).

Stated preference data can be modeled using a probabilistic random utility framework, which assumes individuals clearly state their preferences as described above. The conditional logit model (McFadden, 1974) defines the probability of choosing alternative j as most preferred from the entire set of J alternatives as:

$$\Pr(j) = \Pr(U_j > U_k) \text{ for all } k \neq j, \qquad (1)$$

where U_j is the utility or satisfaction associated with alternative j. Utility consists of an observable component, V_j, and a non-observable component, ε_j. If we assume that the

[4] We omitted Dillman's suggestion to send a final survey copy by registered mail.

observable component is a linear function of a set of explanatory variables then utility can be expressed as:

$$U_j = V_j + \varepsilon_j = \boldsymbol{X_j\beta} + \varepsilon_j, \quad (2)$$

where $\boldsymbol{X_j}$ is a vector of k explanatory variables and $\boldsymbol{\beta}$ is a vector of parameter coefficients to be estimated such that:

$$\boldsymbol{X_j\beta} = \beta_1 X_{j1} + \beta_2 X_{j2} + \ldots + \beta_k X_{jk}. \quad (3)$$

Explanatory variables can include attributes of the alternatives, characteristics of the participant, or both. Following standard practice, we further assume that the non-observable component is independently and identically distributed with an extreme-value (logistic) distribution, such that the probability of choosing alternative j is given by:

$$\Pr(j; \boldsymbol{\beta}) = \exp(\boldsymbol{X_j\beta}) / \textstyle\sum_J \exp(\boldsymbol{X_j\beta}). \quad (4)$$

Similarly, the rank-ordered (or exploded) logit model is a generalization of McFadden's conditional logit model (Beggs et al., 1981; Allison and Christakis, 1994). The probability that a particular ranking of J alternatives (1,2,…,J) has occurred is given by:

$$\text{Prob}(1,2,\ldots,J; \boldsymbol{\beta}) = \text{Prob}(U_1 > U_2 > \ldots > U_J), \quad (5)$$

where U_j is the utility associated with alternative j (j=1,2,…,J). Once again, utility consists of an observable component, V_j, and a non-observable component, ε_j. If we follow the same assumptions as above, then the probability of a particular ranking is given by:

$$\Pr(1,2,\ldots J; \boldsymbol{\beta}) = \textstyle\prod_{J-1} [\exp(\boldsymbol{X_j\beta}) / \sum_J \exp(\boldsymbol{X_j\beta})]. \quad (6)$$

Note that equation (6) is merely a product of J-1 conditional logit functions, one for each step in the ranking process. For example, if a respondent ranks four choices A=1, B=2, C=3, and D=4, then the exploded data set would include three sets of choice outcomes (A>B,C,D), (B>C,D), and (C>D). However, if a respondent includes ties in his rankings, then it is possible to have less

than three sets of choice outcomes. For example, if the respondent ranks the four choices A=1, B=2, C=4, and D=4, then the exploded data set would only include two sets of choice outcomes (A>B,C,D) and (B>C,D) since the respondent did not differentiate between choices C and D.

The rank-ordered logit model can be a statistically efficient model for stated preference studies only if individuals are willing to rank all options carefully according to their underlying preferences. Pooling all rank data in a single model can produce biased preference estimates if, for example, subjects are not able to distinguish less preferred options compared to clearly favorable ones (Chapman and Staelin, 1982; Hausman and Ruud, 1987). Using the first few ranks would likely correct the problem (Chapman and Staelin, 1982), but would discard extra rank information that can be potentially useful. Therefore, we use the latent-class rank-ordered logit model recently proposed by Fok et al. (2012), where individuals' heterogeneities in ranking capabilities are considered and counted in correcting potential ranking bias. The potential bias can arise as a result of heteroscedasticity in the estimation of utility using data from successive ranking levels as might occur if respondents exert less effort and fail to assure correct reporting of lower ranked alternatives according to true underlying preferences.

The latent-class rank-ordered logit model assumes individual have a neoclassical utility function but they may apply it less carefully to lower-ranked alternatives. In this model, individuals are fitted into S classes according to their ranking capability. For example, if individual i carefully ranks k most preferred items, then individual i belongs to class S=k. Assuming that individuals who carefully rank their k most preferred items would rank the remaining S-k randomly rather than according their utility value gives the probability of observing a particular ranking given k items are ranked:

$$\Pr(1,2,...,k|k;\boldsymbol{\beta}) = \prod_k [\exp(\boldsymbol{X_j\beta}) / \sum_J \exp(\boldsymbol{X_j\beta})] \times 1/(S-k)! \quad (7)$$

Note that equation (7) has an additional term 1/(S-k)! compared to equation (6), since if the least preferred S-k items are ranked randomly, all (S-k)! possible combinations of orderings would be equally likely to be observed. Thus, the probability of a particular ranking pattern observed from individual i is (Fok et al., 2012):

$$\Pr(1,2,\ldots J;\ \boldsymbol{\beta},\ p_k) = \sum_S p_k \Pr(j|k;\ \boldsymbol{\beta}) \tag{8}$$

where p_k ($0 \leq p_k \leq 1$, $\sum_S p_k = 1$) is the probability that individual i belongs to class k. The likelihood function used to estimate all (N) respondents can be written as:

$$\begin{aligned} L(\boldsymbol{\beta},\ p_k) &= \prod_N \Pr(1,2,\ldots J;\ \boldsymbol{\beta},\ p_k) \\ &= \prod_N \sum_S p_k \Pr(j|k;\ \boldsymbol{\beta}). \end{aligned} \tag{9}$$

The log of the likelihood function can be maximized numerically with respect to model parameters $\boldsymbol{\beta}$ and the class probabilities p_k. The variances are calculated by the inverse of the estimated Hessian matrix at the optimized parameter values. Since p_k is constrained to be between 0 and 1, we estimate the likelihood function using unconstrained parameter γ_k and bootstrap 1,000 times to get the estimate of the mean and variance of p_k according the transformation function $1/(1+\exp(\gamma_k))$. We assume that people can at least rank their most preferred choice correctly, which means $p_0 = 0$; if this assumption is violated, even the multinomial logit model using the first level rank data would produce biased estimate. The model assumes the respondent's utility function is given and applies to all ranking-levels, while the model accounts for any heterogeneity in respondents' willingness to exert effort in ranking alternatives below the most preferred option.

Maximum likelihood estimation produces a unique set of estimates for the parameters (βs and p_ks), in which βs are interpreted as the marginal effects of the explanatory variables on

utility, often called marginal utility, while p_ks indicate the proportion of the population that make k levels of ranking decisions consistent with their underlying preferences. A positive β coefficient indicates that increasing the level (or amount) of the attribute (e.g., acres) increases utility relative to a base value, while a negative coefficient indicates that increasing the level of the attribute (e.g., cost) reduces utility. Similarly, if the coefficient is positive, then increasing the attribute increases the probability that the alternative is selected or ranked higher, while if the coefficient is negative, then increasing the attribute decreases the probability that the alternative is selected or ranked lower. The size of one coefficient *relative* to another coefficient is an indication of the associated variable's relative contribution to preference.

RESULTS AND DISCUSSION

Response Analysis[5]

A total of 2159 surveys were returned out of a possible 3702 delivered, for a 58% response rate. Table 3 provides a series of response statistics. Of the 4318 possible ranking questions, 4115 (95%) were answered completely. 871 (21%) of the completed questions included tied rankings, indicating a large number of respondents chose not to uniquely rank the four alternatives, which further supports for the use of latent-class ranking model. This was surprising, since no problems of this nature were encountered during pre-tests and we specifically tested the number of alternatives that participants felt comfortable ranking. In answering the actual survey, however, respondents may not be as engaged as focus group members.

[5] Matlab R2009b is used for statistical analysis; *fminsearch* and *fminunc* functions are used for optimization; Hessian matrix is estimated from *fminunc*.

More than two thirds of responses ranked the status quo alternative first, indicating a strong preference for no additional development. Since much development is already occurring in the study towns, respondents appear to confirm planners' view that residents generally oppose still more development. However, one third of respondents *did* indicate a positive willingness to pay for some type of additional development. Moreover, not all respondents ranked both questions in the same manner. For example, while 66% of respondents ranked the status quo alternative first, only 54% ranked it first in both ranking questions. In addition, results of the latent-class rank-ordered logit model (Table 4 and discussed below) indicate that two-thirds of respondents carefully ranked all four choices with equal capability, while less than one quarter ranked their first choice more carefully than the rest. Thus, other alternative-specific attributes (e.g., development type and size) were relevant in the ranking process.

Quite often, survey respondents are unwilling to provide personal information like age, education, and income. In this study, 249 respondents (12%) did not provide answers to one or more socio-economic questions. The response statistics shown in Table 3 are nearly identical for both sets of respondents (all respondents versus those respondents who provided socio-economic data), indicating that potential bias associated with item non-response is minimized. Results below are based on the 3629 ranking questions answered by the 1830 respondents who provided respondent-specific information. Results of a model using all 4115 completed ranking questions, but omitting respondent-specific information, showed no qualitative differences in the alternative-specific effects reported below.

Alternative-Specific Effects

A fully unrestricted latent-class rank-ordered logit model containing all socio-economic characteristics was estimated; those variables significant at the 25% level or better (P<0.25) were maintained in the final model. We keep all the variables indicating recreational or commercial development types to avoid omitted variables bias. Table 4 shows maximum likelihood estimation results for the final model. Likelihood ratio tests were conducted to compare the unrestricted model and the final model; the chi-square statistics indicate that there is no statistically significant difference between these two models[6]. Regarding respondents' ranking capabilities, our model clearly rejects the null hypothesis that *all* respondents are willing to rank *all* alternatives according to their underlying preference function: from the optimization result, we are able to identify that about 24% of respondents rank only their most preferred option carefully, 9% rank their top two options carefully, while 67% rank all options carefully (P1, P2 and P3 in Table 4). Again, it is important to recognize that the latent-class rank-ordered model assumes individual have a neoclassical utility function but they may apply it less carefully to lower-ranked alternatives. The latent-class rank-ordered logit estimation procedure only uses data from choices that show a consistent ranking process.

The majority of coefficients (55 out of 65) in the final model are statistically significant at the 5% level or better, with approximately half significant at the 1% level (Table 4). With a few exceptions to be discussed below, signs on the coefficients are as expected. Increased taxes (TAXES, p<0.01) and the need for traffic controls (STOPLIGHT, p<0.01 and STOPSIGN, p<0.23) all have negative coefficients and thus all reduce utility (as well as the probability that the alternative will be ranked higher that other alternatives). Increasing the distance between a

[6] The log-likelihood statistic for the unrestricted model is -9329.405, the log-likelihood statistic for the final model is -9294.47; we have χ^2=5.00, df=11, P>0.93.

new commercial development and the respondent's home increases utility (a positive coefficient on CMILES). These results follow intuitive expectation. No one wants to pay more taxes. Avoiding traffic congestion is one of the reasons people migrate from urban and suburban areas, so it is not surprising that major and moderate increases in traffic are less preferred to minor increases in traffic and the need for a stoplight reduces utility more than the need for a stop sign. Living farther away from commercial developments also avoids additional noise and air pollution externalities. In comparison, distance to a recreational development (RMILES) was not significant and was eliminated from the final model, indicating a potential indifference to the location of recreational service offerings.

The results regarding land types are somewhat contradictory, in that respondents appear to receive positive utility from both the conversion and preservation of brushland. The preference to develop (i.e., convert) brushland (CONVBRUSH) rather than woodland (CONVWOOD) or farmland (CONVFARM) could be due to its intermediate stage of ecological succession, indicating a lack of on going "productive use" for the land. That is, productive farming is no longer being conducted yet not enough time has passed for the woodland ecosystem to be fully reestablished. In addition, the conversion of brushland avoids additional costs associated with cutting down and removing trees. The preference to preserve brushland (PRESBRUSH) versus preserving woodland (PRESWOOD) and farmland (PRESFARM) is likely due to the scarcity of brushland (less than 1% of all land) in each of the four study towns (Table 1). Each study town also has large amounts of undeveloped woodland (57-73% of all land) and, thus, this result is consistent with standard economic assumptions that predict a higher value associated with desirable but scarce resources.

Based on expert interviews, focus groups, and survey pretests, we anticipated that exurban residents would be willing to pay for at least some types of additional development. In observing recent local support for land trusts, we also anticipated a positive willingness to pay for open space preservation with and without public access. However, in this study, as outlined below for a typical respondent, results (Table 4) indicate a lack of willingness to pay for most types of commercial and recreational development relative to the status quo rate of land conversion. We use the term "typical respondent" to refer to the base case respondent. Respondent-specific demographic effects are discussed in detail in a later section.

The statistical model of preferences uses the status quo rate of development (STATQUO) as the base case, so coefficients on commercial and recreational service types measure the change in utility from having the additional service rather than no additional services beyond the current trend in development. Thus, negative coefficients on service types indicate a lack of willingness to pay for that service. In Table 4, only HIKING shows a positive significant (at 5% level) coefficient, but that coefficient is an add-on to the coefficient for REFUGE, indicating the net effect of preserving a refuge that has public access. The positive effect of public access has been shown as important to the value of land conservation in other studies (Bauer et al., 2004; Kline and Swallow, 1998; McGonagle and Swallow, 2005). In our case, a Wald test rejects the null hypothesis that the utility gain from public access conditioning on the existence of a refuge is equal to the utility only indicated by the refuge coefficient alone (HIKING=0, df=1, $P<0.01$). In these results, the typical respondent shows that preservation of a refuge with public access is valued more than preservation of a refuge without public access, both of which are preferred to the status quo, though the refuge coefficient is not significant ($P<0.38$). If other attributes are also considered, such as a refuge with public access that also preserves brushland and does not

add new traffic controls, the typical respondent may favor more of such a refuge over the status quo. With all other service type coefficients negative, results indicate an overall lack of support for any non-refuge type of recreational or commercial development. These results may reflect the stage of exurbanization of the four towns, including the existence of large amounts of state and federal open space and undeveloped private land, and the presence of commercial or recreational services that the residents already believe are adequate (Table 1; Bates and Santere, 2001). Yet these results are surprising given the expectation of town planners and comments observed in focus groups.

In Table 4, magnitudes of the service type coefficients do permit assessments of the relative rankings of service types. All recreational type services are preferred to (coefficients are significantly less negative than) commercial type services, with the preservation of a wildlife refuge being most preferred. Sports fields (SPORTS) and recreation centers (RECCTR) result in similar levels of utility for the typical respondent (a Wald test fails to reject the null hypothesis that the coefficients are equal; χ^2=0.61, df=1, P>0.43) and both are preferred to golf courses (GOLF). This result is consistent with the notion that the typical respondent household is less likely to include a golf specialist and more likely to include general recreation enthusiasts, so that other recreation facilities are more highly valued to an average household.

For the commercial type services, it appears that convenience stores (QUIKSTOP), full-service restaurants (RESTRANT), and small-scale shops (SHOPS), are most preferred while multi-screen cinema complexes (CINEMA) are least preferred. Convenience stores and full-service restaurants were two commercial service types described as "necessary conveniences" in focus groups. Small towns or villages often contain small-scale shops, rather than the big chain stores found in traditional suburbia. These shops are part of the rural aesthetic that attracts

residents to exurban towns. At the opposite extreme of ruralness, it's not surprising to find multi-screen cinema complexes the least desirable service type. Despite controlling for traffic congestion elsewhere in the model, movie cinemas may also be associated with a large influx of non-residents (often young adults) increasing noise, air pollution, and potentially other less-desirable activities. Residents of one study town (Exeter) had recently defeated a proposal for a cinema complex, and this may have been in the minds of many respondents while ranking alternatives. In sum, the typical respondent prefers the status quo trend in development, followed by less intensive recreational forms of development rather than commercial types of development.

The positive and statistically significant coefficients for multiple commercial services in Table 4 represent the incremental benefit of combining two services within a single development (i.e., an interaction effect). Thus, to determine the overall effect of multiple commercial services, it is necessary to add three coefficients together (Table 5). For example, a development that contains both a convenience store and a fast-food restaurant (QUIKFAST) would have a total service type effect equal to $-1.50 + (-2.39) + 1.69 = -2.20$. Combining these two commercial services together creates a disutility that is roughly equivalent to one of the services alone. That is, the typical respondent prefers the two-service development with both a convenience store and a fast-food restaurant at least as much as a development of a fast-food restaurant alone. As Table 5 shows, two thirds of the multi-commercial service developments result in the second commercial service coming with no additional loss in utility (Total Effect < Individual Service Effect). Thus, exurban residents appear to agree with developers that combining commercial services into a single development parcel is a good strategy, which may be due to the convenience factor of one-stop shopping or, alternatively, could be a reflection of

the perceived conservation value of a shared parking lot. The positive and significant (at 10% level) coefficient of CACRES also supports the interpretation that exurban residents prefer combined, multiple commercial services because, if a commercial service is to be built, residents appear to prefer a larger facility with more adequate space for parking. However, it is worth noting that even at the maximum acreage used in the survey (50 acres), this effect is never enough to offset the disutility of the commercial development.[7]

Noticeably missing from the main effects in the final model are the explanatory variables for size of recreational development (RACRES) and type of road (MAINROAD or BACKROAD). These variables were found to be statistically insignificant in the fully unrestricted model. It is highly unlikely that recreational size does not matter in these results. One possible explanation is that most recreational service types (e.g. sports fields) have a perceived size associated with them and that this perception overwhelms the specific acreage included in the survey question, despite pre-test participants insisting they compared all attributes in all alternatives. Alternatively, the recreational size effects may not be important for the group of study towns at this point in time, given the large amounts of undeveloped land remaining in each (Table 1). The lack of significance on road type could be due to residents' knowledge of local zoning regulations that limit where development can occur and that even a commercial development on a back road would not likely end up in a residential neighborhood.

Respondent-Specific Effects

Despite the statistically significant negative coefficients on most service types (Table 4), one third of respondents ranked a development alternative first. Since exurban towns are at

[7] This point still holds even if commercial development involved 150 acres which was the maximum size the survey presented for a recreational project.

different stages of growth and have different mixes of newcomers versus long-time residents, planners are often interested in identifying the characteristics of those residents that support development and those that do not. A likelihood ratio test rejects the null hypothesis that respondent-specific characteristics (demographic interactions in Table 4) contribute nothing to the final model ($p<0.01$).

When demographic characteristic variables are interacted with broad-scale service types (recreational or commercial development), a positive coefficient indicates that the respondent with the attribute is generally more supportive of scenarios under the associated service type. Respondents that show relatively strong support for recreational types of development include those with a college education (RCOLLEGE, $p<0.01$) and household incomes over $80,000 (RINC80, $p<0.01$), who have at least one child (RCHILD, $p<0.01$), live in village center (RVILLAGE, $p<0.01$) and who have lived longer in town (RYRSTOWN, $p<0.05$). These are consistent with expectations, as those households with children would be more likely to take advantage of recreational amenities while households with higher incomes are more able to afford them. Respondents relatively less likely to support recreational development are older residents (RAGE, $p<0.01$), women (RFEMALE, $p<0.05$), those living on farms (RFARM, $p<0.01$), and those whose house lot size is equal to or greater than two acres (LARGELOT, $p<0.12$), though the coefficient for LARGELOT is less significant.

Higher income residents (CINC80, $p<0.10$) and those living in village centers (VILLAGE, $p<0.05$) are more likely to support commercial development. Respondents relatively less likely to support commercial development include those living in rural residences (CRURAL, $p<0.01$) and those living on or near farms (CFARM, $p<0.01$). Interestingly, respondents living on or near farms were less likely to support both recreational and commercial

development, perhaps due to a traditional rural land ethic that prefers agricultural or forestry land uses.

Respondents from Burrillville, Coventry, and Exeter are more likely to prefer both recreational and commercial development than residents of West Greenwich. This may be due to these towns being at a particular stage of exurbanization, having reached a certain population density or "newcomer" migration threshold compared to West Greenwich (Table 1). While the four study towns are heterogeneous in terms of exurban characteristics (e.g., population density, percent undeveloped forest, percent farmland), a likelihood ratio test rejects the hypothesis that the data cannot be pooled ($p=0.2617$). However, in order to identify potential differences between towns, we re-estimated the model using data from one town at a time. Table 6 shows recreational and commercial service coefficients from maximum likelihood estimation performed for each town. The general trends are the same for all towns. First, most developments have negative coefficients indicating a strong opposition to any new development. Second, recreational developments are generally preferred to commercial developments (i.e., recreational developments reduce utility by a smaller amount), with refuge being the most preferred and movie cinema being the least preferred. Third, public access in the form of hiking trails increases utility. In addition to these common trends, there are some minor differences between towns. Coventry residents, on average, indicate a stronger inclination to recreational development compared to other towns, which coincides with the fact that Coventry has the largest population density per square miles than the other towns in the study (Table 1). REFUGE, HIKING, and RECCTR are all positively significant in Coventry indicating a positive willingness to pay for these recreational services, whereas SPORTS and GOLF are not significantly different from zero indicating a relative indifference between these recreation

services and the status quo. In comparison, HIKING is positive and significant while REFUGE is not significantly different from zero in Exeter indicating a positive willingness to pay for wildlife refuges, but only if public access is allowed. With both HIKING and REFUGE coefficients not significantly different from zero, Burrillville and West Greenwich residents on average would be indifferent to the addition of more preservation with or without public access, provided it did not require the addition of traffic controls. In contrast to residents in Coventry, residents in Burrillville, Exeter, and West Greenwich are opposed to additional golf courses (GOLF is significantly negative).

In terms of commercial services, Coventry is again slightly different from the other three towns. Burrillville, Exeter and West Greenwich prefer a convenience store (QUIKSTOP) while Coventry prefers a full-service restaurant (RESTRANT) to all other types of commercial developments. A multi-screen cinema complex (CINEMA) is the least preferred development type in Burrillville, Exeter and West Greenwich, while fast food restaurant (FASTFOOD) is the least preferred development type in Coventry. In addition to the two extremes, residents in Coventry prefer a grocery super store (GROCERY) over small-scale retail shops (SHOPS), while the other three towns prefer the shops. These results are likely indicative of which services are noticeably missing from individual towns. The one exception to this is a movie cinema: at the time of data collection, none of the towns currently had one, but none wanted one either.

SUMMARY AND CONCLUSIONS

Exurban communities offer residents a diversity of rural amenities. However, the low-density development characterizing exurban communities can result in a lack of conveniences. This paper reports on a stated preference study that assesses the relative attractiveness of a

variety of commercial and recreational development (i.e., land conversion) scenarios in an effort to provide insights to the changes that residents of exurban communities might want and to illustrate how planners and policy makers could assess these desires.

For preliminary analysis we estimated a multinomial rank-ordered logit model based on respondents' top choice, ignoring the information available in respondents' lower rankings. That analysis appeared to support our general conclusion as well: status quo is preferred over development options; and recreational services are preferred over commercial services if developments were to occur. The analysis reported here, based on the latent-class rank-ordered logit model proposed by Fok et al. (2012) enabled identification of useable rankings at lower levels, so the analysis is built on a larger information base. The model is capable of correcting biases that could have resulted from respondents' "random choice" at lower rankings, which enables more effective and more confident use of stated ranking data.

Our study tested a hypothesis developed through numerous informal discussions with planners and officials in four Rhode Island towns. That hypothesis suggested that residents in exurban towns would want additional development of some commercial conveniences, above and beyond current trends dominated by residential development in the four towns. Surprisingly, results rejected the hypothesis in all four towns; residents clearly tended to prefer maintaining the status quo trend in development of their towns. However, one third of respondents indicated support for some type of land use change, with land preservation in the form of a wildlife refuge with or without public access being more highly valued than other types of land conversion for commercial or other recreational uses. Analysis of individual towns showed residents in Coventry to have slightly different preferences for service types than the other three town, which can potentially be explained by the town's population size and density and current land use (e.g.,

the eastern half of the town closer to Providence is more suburban in nature while the western half is more rural residential).

Samuelson and Zeckhauser (1988) raised the issue of status quo bias (i.e., a disproportionately large number of status quo responses) in decision making. Several possible explanations for status quo bias in choice experiments have been discussed in the literature including endowment effects, protest attitudes of respondents, and complexity of the choice question (Adamowicz et al., 1998; Kahneman et al., 1991; Meyerhoff and Liebe, 2009). We conducted several pretests of the survey instrument and feel confident that the choice task of ranking the four alternatives was not overly complex. A small number of responses (5%) ranked the alternatives A=4, B=4, C=4, D=1 (recall the status quo alternative was always option D), potentially indicating a protest attitude or endowment effect related to forest loss aversion at least among a small number of respondents (3% of respondents ranked both questions in this manner). We unfortunately did not include specific follow-up questions in our survey to test for this situation so we have no way of knowing whether the high percentage of status quo responses is reflective of a true preference for no additional development beyond the current rate of development or if there is a real bias. The latent-class rank-ordered logit model does account for differences in ranking capability among choices and results showed that three-quarters of responses ranked at least two choices equally carefully and 68% ranked all four choices equally carefully, so any status quo bias may be limited to a small number of responses.

In our preliminary work, leading to the design of our stated preference survey, both focus group respondents and town officials suggested the public desired additional commercial services in their towns. Therefore, our survey design presumed that the typical respondent would be willing to pay a positive amount to obtain one or more additional commercial service types

beyond the status quo trend. Yet, because the typical respondent actually preferred the status quo in two-thirds of the stated choices, it is clear that willingness to pay would be negative (the typical resident would oppose an additional commercial development and would need to receive compensation in order to support the development). Future studies should allow for the possibility that residents may actually prefer, on average, to avoid additional commercial developments, despite the impression that town officials may have developed through, for example, comments from vocal residents.

A weaker form of the main hypothesis could be that, while residents generally prefer the status quo, they do prefer some commercial services if development must occur. The preference model does show that the typical respondent does prefer recreational developments over most of the commercial developments, indicating that the typical respondent prefers public good amenities rather than additional commercial services (except for Burrillville residents who prefer all non-cinema commercial services over a golf course). Still, results do show that, in cases where one commercial service is being developed, there is no additional loss of utility if a second commercial service is added along side the first. This result suggests that residents would prefer that their town officials encourage commercial developers to provide integrated or multi-purpose developments when a site does undergo conversion. In addition, there was a strong preference for preservation of parcels with brush land, which is the scarce land type in these towns, a result that can help planners identify parcels that the public would more likely want preserved rather than developed.

The study also identified socio-economic characteristics of residents that seem to corroborate a heterogeneous mix of residents in exurban communities. Exurban residents who live in village centers are more likely to support commercial development compared to those

who live in large-lot rural residential areas, while those who live on or near farms are more opposed to all types of development. The implication for planners is that local zoning and other regulations can be modified to locate different types of new residential development near desired service amenities. Respondents with higher incomes or education levels tended to favor recreational developments over commercial development. The evaluation of respondent characteristics do show old-time residents prefer recreational service, while the difference between newcomer versus old-time residents do not stand out in evaluating commercial services. Stated preference results, such as those reported here, may assist planners and policy officials as proposals for development work through the planning, permitting, or zoning reviews in many municipalities, such as those in southern New England. During such review processes, decision-makers have an opportunity to influence development proposals or even to update ordinances and zoning guidelines to improve the correspondence between new developments and the desires of existing residents.

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Table 1. Study Town Census[a] and Land Use[b] Statistics

	Burrillville	Coventry	Exeter	West Greenwich	Rhode Island
Total Area – miles^2	57.2	62.4	58.4	51.3	1045
(kilometers^2)	(148.1)	(161.6)	(151.3)	(132.9)	(2707)
2010 Population	15,955	35,014	6,425	6,135	1,052,567
2000 Population	15,796	33,668	6,045	5,085	1,048,319
1990 Population	16,230	31,083	5,461	3,492	1,003,464
1980 Population	13,164	27,065	4,453	2,738	947,154
1970 Population	10,087	22,947	3,245	1,841	949,723
% change (90-00)	-2.7	8.3	10.7	45.6	4.5
% change (00-10)	1.0	4.0	6.3	20.6	4.1
2000 Pop. Density – per miles^2	276	539	104	99	1003
(per kilometers^2)	(107)	(208)	(40)	(38)	(387)
2010 Housing Units	6,419	14,310	2,511	2,370	464,728
2000 Housing Units	5,821	13,059	2,196	1,809	439,837
1990 Housing Units	5,751	11,788	1,919	1,370	414,572
% change (90-00)	1.2	10.8	14.4	32.0	6.1
% change (00-10)	10.2	9.6	14.3	31.0	5.7
As of the year 2000					
% 25-65 Years	55.3	40.5	57.6	58.6	51.6
% Over 65 Years	11.4	13.0	9.8	7.1	14.5
% College Education	45.4	48.9	60.5	64.1	42.6
Median Income	53K	52K	64K	66K	42K
% Income > 75K	26.2	26.2	43.3	40.5	22.1
Undeveloped Woodland - acres	24,900	22,800	26,100	23,900	
Undeveloped Farmland - acres	1,400	1,500	2,800	1,200	
Undeveloped Brushland - acres	400	350	300	400	
Total Area - acres	36,500	40,000	37,400	32,800	

[a]Source: U.S. Census Bureau (2012)
[b]Source: Rhode Island Geographic Information System (RIGIS)

Table 2. Descriptions of Explanatory Variables

Explanatory Variable	Description	
Land Use Alternative Main Effects		
TAXES	additional increase in annual taxes ($) above and beyond current tax rate (0, 25, 75, 125, 175, 225, 275, 325)	
STOPLIGHT	major increase in traffic resulting in a new stop light	
STOPSIGN	moderate increase in traffic resulting in a new stop sign	
NOCONTROL	minor increase in traffic; no new traffic controls needed	
CONVWOOD[a]	wood land is converted	
CONVFARM[a]	farm land is converted	
CONVBRUSH[a]	brush land is converted	
PRESWOOD[a]	wood land is preserved	
PRESFARM[a]	farm land is preserved	
PRESBRUSH[a]	brush land is preserved	
RACRES	number of acres converted for recreational development (5, 10, 15, 20, 50, 85, 115, 150)	
CACRES	number of acres converted for commercial development (2, 4, 6, 8, 10, 25, 35, 50)	
RMILES	proximity to respondent's home (4, 8, 12, 16)	
CMILES	proximity to respondent's home (4, 8, 12, 16)	
RMAINROAD	recreational development occurs on a major roadway	
CMAINROAD	commercial development occurs on a major roadway	
RBACKROAD	recreational development occurs on a secondary road	
CBACKROAD	commercial development occurs on a secondary road	
STATQUO	status quo indicator – no new development above and beyond what is currently taking place in town	
REFUGE	wildlife refuge	
HIKING	public access to refuge in the form of hiking trails, conditioning on the existence of the refuge	
SPORTS	sports fields and playground	
RECCTR	activity and recreation center	
GOLF	golf course	
GROCERY	grocery "super" store	
RETAIL	retail "super" store	
SHOPS	group of small-scale retail shops	
CINEMA	multi-screen cinema complex	
QUIKSTOP	convenience store	
RESTRANT	full-service restaurant	
FASTFOOD	fast-food restaurant	
Respondent Characteristics		
AGE	age	mean=47.6, std.=12.7

FEMALE	female	33% of respondents
COLLEGE	attended college	61% of respondents
INC80	household income > $80,000	28% of respondents
CHILD	household contains at least one child	43% of respondents
COMMUTER	commutes to work outside town	68% of respondents
LARGELOT	house lot size ≥ 2 acres	48% of respondents
URBAN[a]	lives in urban area	3% of respondents
SUBURB[a]	lives in suburban area	13% of respondents
VILLAGE[a]	lives in village center	5% of respondents
RURAL[a]	lives in rural residential area	68% of respondents
FARM[a]	lives on a farm	11% of respondents
YRSTOWN	number of years living in town	mean=16.6, std.=15.6
BURRVILL	lives in Burrillville	25% of respondents
COVENTRY	lives in Coventry	23% of respondents
EXETER	lives in Exeter	25% of respondents
WGREEN	lives in West Greenwich	27% of respondents

[a]Land type interactions and residential locations are implemented using effects coding (1,0, -1), where a 1 indicates the presence of the attribute, a –1 indicates the absence of the attribute, and a 0 indicates no attribute (i.e., the status quo option) such that the interpretation is the effect versus all others. All other indicator type variables are implemented using dummy coding (0,1), where a 1 indicates the presence of the attribute and 0 indicates the absence of the attribute such that the interpretation is the effect versus the base case (i.e., the level left out of the model).

Table 3. Survey Question Response Statistics

	All Completed Questions	Completed Questions with Respondent Characteristics
Total Respondents (R)	2079	1830
Total Questions (Q)	4115	3629
Tied Rankings	871 (21% of Q)	758 (21% of Q)
Development Ranked 1st	1283 (31% of Q)	1141 (31% of Q)
Status Quo Ranked 1st	2732 (66% of Q)	2397 (66% of Q)
4-4-4-1 Response	220 (5% of Q)	180 (5% of Q)
Both Questions Dev. 1st	393 (19% of R)	353 (19% of R)
Both Questions S.Q. 1st	1129 (54% of R)	989 (54% of R)
Both 4-4-4-1 Responses	62 (3% of R)	51 (3% of R)

Table 4. Maximum Likelihood Coefficient Estimates

Explanatory Variables[a]	Coefficient	Standard Error	P[|Z|>z]
Main Effects			
TAXES	-0.0055	0.0002	0.0001
STOPLIGHT	-0.4508	0.0587	0.0001
STOPSIGN	-0.0645	0.0534	0.2312
CONVWOOD	-0.1099	0.0824	0.1870
CONVFARM	0.0648	0.0979	0.5102
CONVBRUSH[b]	0.1771	--------	--------
PRESWOOD	-0.0255	0.0666	0.7032
PRESFARM	-0.1253	0.0677	0.0687
PRESBRUSH[b]	0.1691	--------	--------
CMILES	0.0119	0.0073	0.1099
CACRES	0.0047	0.0027	0.0782
Recreational Services			
HIKING	0.4767	0.1842	0.0119
REFUGE	0.1634	0.1829	0.3749
RECCTR	-0.4653	0.1759	0.0102
SPORTS	-0.5339	0.1756	0.0034
GOLF	-1.0987	0.1776	0.0001
Commercial Services			
SHOPS	-1.7939	0.2240	0.0001
QUIKSTOP	-1.4975	0.2381	0.0001
RESTRANT	-1.6180	0.2388	0.0001
GROCERY	-2.1126	0.2275	0.0001
FASTFOOD	-2.3920	0.2857	0.0001
RETAIL	-2.3213	0.2277	0.0001
CINEMA	-3.0299	0.2637	0.0001
Multiple Services			
SHOPREST	1.4415	0.3148	0.0001
GROCREST	1.0958	0.3558	0.0030
RETREST	1.5540	0.3150	0.0001
RETSHOP	1.7154	0.2979	0.0001
QUIKREST	1.3869	0.3363	0.0001
CINEQUIK	1.8161	0.3522	0.0001
GROCFAST	1.9701	0.3692	0.0001
GROCSHOP	1.9327	0.3121	0.0001
SHOPCINE	2.2149	0.3449	0.0001
GROCQUIK	1.6390	0.3192	0.0001
SHOPFAST	2.3170	0.3482	0.0001
QUIKFAST	1.6871	0.3709	0.0001
RETQUIK	1.7171	0.3426	0.0001
CINEFAST	2.2970	0.3871	0.0001
RETFAST	2.3623	0.3658	0.0001

RESTFAST	2.0149	0.3580	0.0001
CINEREST	2.2087	0.3508	0.0001
SHOPQUIK	1.8282	0.3156	0.0001
GROCRET	2.4203	0.2955	0.0001
GROCCINE	2.4626	0.3677	0.0001
RETCINE	2.5730	0.3625	0.0001
Recreation Effects[c]			
RCOLLEGE	0.2296	0.0778	0.0044
RINC80	0.3632	0.0770	0.0001
RCHILD	0.2329	0.0650	0.0006
RAGE	-0.0118	0.0027	0.0001
RFEMALE	-0.1273	0.0598	0.0370
RFARM	-0.7489	0.1316	0.0001
RVILLAGE	0.4272	0.1800	0.0205
RLARGELOT	-0.1862	0.1149	0.1100
RYRSTOWN	0.0042	0.0020	0.0386
RBURRVLL[d]	0.4477	0.1037	0.0001
RCOVNTRY[d]	0.3170	0.1060	0.0039
REXETER[d]	0.5139	0.0997	0.0001
Commercial Effects[e]			
CCOLLEGE	-0.1240	0.0991	0.2154
CRURAL	-0.3383	0.1090	0.0028
CINC80	0.1800	0.1035	0.0866
CFARM	-0.8033	0.1845	0.0001
CVILLAGE	0.6046	0.2308	0.0109
CLARGELOT	-0.2099	0.1419	0.1440
CBURRVLL[d]	0.6347	0.1359	0.0001
CCOVNTRY[d]	0.4481	0.1432	0.0026
CEXETER[d]	0.5360	0.1364	0.0002
Class Probability			
P1	0.2377	0.0003	0.0001
P2	0.0865	0.0009	0.0001
P3	0.6758	--------	--------

Log likelihood: -9296.97, df=65

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[a]Definitions given in Table 2.
[b]Land type variables were implemented using effects coding, thus brushland coefficients are calculated as –1(iWOOD+iFARM) for i=CONV, PRES.
[c] Recreation effects are the interaction effects that are implemented as the product of two variables (e.g., RCOLLEGE=RECREATION*COLLEGE), RECREATION is a dummy variable indicating if an option presents a recreational development.
[d]Coefficient is relative to residency in West Greenwich.
[e]Commercial effects are the interaction effects that are implemented as the product of two variables (e.g., CCOLLEGE=COMMERCIAL*COLLEGE), COMMERCIAL is a dummy variable indicating if an option presents a commercial development.

Table 5. Total Marginal Effect of Multiple Service Developments

Multiple Service Offerings[a]	Service 1 Effect	Service 2 Effect	Joint Effect	Total Effect[b]
SHOPREST	-1.7939	-1.6180	1.4415	-1.9704
GROCREST	-2.1126	-1.6180	1.0958	-2.6348
RETREST	-2.3213	-1.6180	1.5540	-2.3853
RETSHOP	-2.3213	-1.7939	1.7154	-2.3998
QUIKREST	-1.4975	-1.6180	1.3869	-1.7286
CINEQUIK	-3.0299[c]	-1.4975	1.8161	-2.7113
GROCFAST	-2.1126	-2.3920	1.9701	-2.5345
GROCSHOP	-2.1126[c]	-1.7939	1.9327	-1.9738
SHOPCINE	-1.7939	-3.0299[c]	2.2149	-2.6089
GROCQUIK	-2.1126[c]	-1.4975	1.6390	-1.9711
SHOPFAST	-1.7939	-2.3920[c]	2.3170	-1.8689
QUIKFAST	-1.4975	-2.3920[c]	1.6871	-2.2024
RETQUIK	-2.3213[c]	-1.4975	1.7171	-2.1017
CINEFAST	-3.0299	-2.3920	2.2970	-3.1249
RETFAST	-2.3213	-2.3920[c]	2.3623	-2.3510
RESTFAST	-1.6180	-2.3920[c]	2.0149	-1.9951
CINEREST	-3.0299[c]	-1.6180	2.2087	-2.4392
SHOPQUIK	-1.7939[c]	-1.4975	1.8282	-1.4632
GROCRET	-2.1126	-2.3213[c]	2.4203	-2.0136
GROCCINE	-2.1126	-3.0299[c]	2.4626	-2.6799
RETCINE	-2.3213	-3.0299[c]	2.5730	-2.7782

[a]Definitions given in Table 2. Using these variables names, service effect 1 lists the coefficient for the commercial service indicated by the first part of the multiple-services variable name.
[b]Total effect the is sum of effects for service 1, service 2, and the multi-service joint effect.
[c]Additional service results in no additional loss of utility. If this service comes to be built, then adding the second and there may be a net gain in utility as a result of the joint effect.

Table 6. Four Town Comparisons of Service Offerings

Service Offerings[a]	Burrillville	Coventry	Exeter	West Greenwich
Recreational Services				
HIKING	0.5126	1.5442***	0.6132*	0.4745
REFUGE	0.2626	1.3520***	0.0656	0.2550
RECCTR	-0.3349	0.6244*	-0.3909	-0.5601
SPORTS	-0.3985	0.4477	-0.4945	-0.4852
GOLF	-1.2394***	-0.3045	-0.8000**	-0.9399***
Commercial Services				
SHOPS	-0.6157	-1.4939***	-1.5610***	-1.9741***
QUIKSTOP	-0.5170	-1.0512**	-1.4470***	-1.1496**
RESTRANT	-0.6995*	-0.9648**	-1.4669***	-1.6669***
GROCERY	-1.0392**	-1.2395***	-2.3464***	-2.2224***
FASTFOOD	-1.0189**	-2.2499***	-2.1028***	-2.7325***
RETAIL	-0.9548**	-1.9309***	-2.0505***	-2.9504***
CINEMA	-2.1153***	-2.1161***	-3.0631***	-3.1655***
Monetary Coefficient				
TAXES	-0.0054***	-0.0067***	-0.0047***	-0.0058**

[a]Definitions given in Table 2.
***Significant at 1% level.
**Significant at 5% level.
*Significant at 10% level.

Figure 1. Sample Survey Question

C1. Please rank service options A through D in order of your preference, with "1" being the option you like most and "4" being the option you like least. Use each number (1, 2, 3, 4) only once.

OPTION A **Rank _____**

A **grocery "super" store**  and **multi-screen cinema complex**  will be built within **16 miles** of your home on a **main road**.

10 acres of **brushland**  will be developed for this service.

A **moderate increase in traffic** from this service will result in a new **stop sign**  being required.

Your **taxes will increase by $175 per year** due to this service.

OPTION B **Rank _____**

Small-scale retail shops  will be built within **16 miles** of your home on a **back road**.

10 acres of **woodland**  will be developed for this service.

A **moderate increase in traffic** from this service will result in a new **stop sign**  being required.

Your **taxes will increase by $325 per year** due to this service.

OPTION C **Rank _____**

A **wildlife refuge with hiking trails**  will be built within **8 miles** of your home on a **main road**.

115 acres of **farmland**  will be preserved for this service.

A **major increase in traffic** from this service will result in a new **stop light**  being required.

Your **taxes will increase by $175 per year** due to this service.

OPTION D **Rank _____**

No new services will be added beyond what is currently taking place in your town.

All development will continue at the current rate.

Taxes will continue at the current rate.